Natural Resources Conservation Service

CONSERVATION PRACTICE STANDARD

RIPARIAN FOREST BUFFER

CODE 391

(ac)

DEFINITION

An area predominantly trees and/or shrubs located adjacent to and up-gradient from watercourses or water bodies.

PURPOSE

This practice is used to accomplish one or more of the following purposes–

- Create shade to lower or maintain water temperatures to improve habitat for aquatic organisms
- Create or improve riparian habitat and provide a source of detritus and large woody debris
- Reduce excess amounts of sediment, organic material, nutrients and pesticides in surface runoff and reduce excess nutrients and other chemicals in shallow ground water flow
- Reduce pesticide drift entering the water body
- Restore riparian plant communities
- Increase carbon storage in plant biomass and soils

CONDITIONS WHERE PRACTICE APPLIES

Riparian forest buffers are applied on areas adjacent to permanent or intermittent streams, lakes, ponds, wetlands, sinkholes, and other areas of groundwater recharge that are capable of supporting woody vegetation. They are not applied to stabilize stream banks or shorelines.

CRITERIA

General Criteria Applicable to All Purposes

Position and design the riparian forest buffer to achieve sufficient width, length, vertical structure/density and connectivity to accomplish the intended purpose(s).

Dominant vegetation will consist of existing, naturally regenerated, or seeded/planted trees and shrubs suited to the soil and hydrology of the site and the intended purpose(s).

Species on the Federal or State noxious weeds list, or those know to be invasive to the planting area shall not be planted.

Extend the vegetation a minimum width to achieve the purpose(s). Begin measurement at and perpendicular to the normal water line, bank-full elevation, or the top of the bank as determined locally. Assess the severity of bank erosion and its influence on existing or potential riparian trees and shrubs.

Maintain overland flow through the riparian area will be maintained as sheet flow.

Control excessive sheet-rill and concentrated-flow erosion in the areas immediately adjacent and up-gradient of the buffer site.

Use the Virginia Technical Note Forestry #3, Tree and Shrub Establishment Guidelines and the Virginia Plant Establishment Guide located on the Virginia Field Office Technical Guide (FOTG) at https://efotg.sc.egov.usda.gov/references/public/VA/VA_TN3_Forestry_Update_2015_Final_3.30.16.pdf, for all recommendations for planting rates, species selection, planting methods and techniques and establishment dates.

For plantings and seeding, only viable, high-quality and adapted plant materials will be used. Use tree and shrub species which are native and non-invasive. All tree seedlings for hardwood tree planting must be 18 inches tall or have a diameter of 1/4inch. If using tree whips, these species must have a root collar diameter of 3/8 inch and be approximately 3 feet in height.

No single species will make up more than 50% of the total number of species planted.

Favor tree and shrub species that have multiple values such as those suited for timber, nuts, fruit, florals, browse, nesting, and aesthetics.

Natural regeneration may be utilized on sites not suited to any kind of tree planting or where there is an adequate natural seed source. The tree planting plan developed for establishing the buffer will include justification for use of natural regeneration. Natural regeneration may be used under any of the following conditions:

- Local reports or a site inspection indicate that the site is flooded, subject to swift currents, or too wet for planting equipment in both spring and fall of the typical year.
- The site is inaccessible to planting equipment (islands or other remote sites).
- There are existing mature trees suitable to the planting area, preferably including at least 2 hard mast tree species, within 100 feet of the entire planting site or evidence of existing seedlings.

Native Non-Invasive volunteer species that exist onsite within the seed-bank will establish themselves. The establishment of these species is encouraged to promote a diverse and fully functional buffer.

Use necessary site preparation and planting methods at a time and manner to ensure survival and growth of selected species for achieving the intended purpose(s). Refer to Virginia Conservation Standard Tree Shrub Site Preparation (Code 490) and theVirginia Technical Note Forestry #3, Tree and Shrub Establishment Guidelines.

For sheltered trees, in order to improve plant growth, additional years of chemical weed control after the plants are established may be necessary. Weed control should be performed using bands (2-4' wide) on each side of a plant row or circles around each tree unless the entire site needs to be treated. Refer to Virginia Conservation Standard Herbaceous Weed Control (Code 315) or Brush Management (Code 314).

Periodic removal of some forest products such as high value trees, medicinal herbs, nuts, and fruits is permitted provided the intended purpose is not compromised by the loss of vegetation or harvesting disturbance. Tree removal should follow the Forestry Best Management Practices for Water Quality.

Harmful plant and animal pests present on the site will be controlled or eliminated as necessary to achieve and maintain the intended purpose. If pesticides are used, refer to Virginia Conservation Standard *Pest* Management (Code 595).

Specific pesticide recommendations will be obtained from personnel who are licensed by the Virginia Department of Agricultural and Consumer Services in one of the forest pest management categories in accordance with Virginia's Pesticide Laws and Regulations. If chemical herbicides or pesticides are used, follow all instructions for the particular chemical on the product label and as outlined in the Virginia Pest Management Guide(2011 edition and subsequent revisions) as maintained by the Virginia Cooperative

Extension Service. The specific pesticide container label addressing instructions and safety precautions shall be strictly followed as it applies to handling, applying in proximity to water resources, and storage.

Each site will be evaluated to determine if mulching, supplemental water or other cultural treatments (e.g. tree protection devices, shade cards, brush mats) will be needed to assure adequate survival and growth. (Refer to the Virginia Plant Establishment Guide and Virginia Technical Note #3, Tree and Shrub Establishment Guidelines for specifications)

Livestock shall be controlled or excluded as necessary to achieve the intended purpose. Refer to the Virginia Conservation Practice Standards Prescribed Grazing (Code 528), Fence Code (382), and/or Access Control (Code 472) as applicable.

Additional Criteria to Reduce Excess Amounts of Sediment, Organic Material, Nutrients and Pesticides in Surface Runoff and Reduce Excess Nutrients and Other Chemicals in Shallow Ground Water Flow

The minimum width shall be at least 35 feet measured horizontally on a line perpendicular to the water body beginning at the normal water line, bank-full elevation, or the top of the bank as determined locally.

The width will be extended in high nutrient, sediment, and animal waste application areas, where the contributing area is not adequately treated or where an additional level of protection is needed.

Existing, functional underground drains through the riparian area will pass pollutants directly to the outlet. To filter such pollutants, drains can be plugged, removed or replaced with perforated pipe/end plugs or water control structures (see Virginia Conservation Practice Standard Structure for Water Control (Code 587) to allow passage and filtration of drain water through the riparian forest root zone.

Caution is advised that saturated conditions in the riparian and adjacent areas may limit existing land use and management.

Additional Criteria to Create Shade to Lower or Maintain Water Temperatures to Create or Improve Riparian Habitat and Provide a Source of Detritus and Large Woody Debris

The width will be extended to meet the minimum habitat requirements of the wildlife or aquatic species of concern. Select species capable of achieving desired height and crown density required for shade production and shadow length equal to or greater than the water course. Place drooping or wide-crowned trees and shrubs nearest the water course or body. Establish the buffer canopy to achieve at least 50% crown cover.

Establish plant communities that address the target aquatic and terrestrial wildlife and pollinator needs and have multiple values such as habitat, nutrient uptake and shading. The establishment of diverse native woody and herbaceous species will enhance wildlife and pollinator values.

Additional Criteria for Increasing Carbon Storage in Biomass and Soils

Maximize width and length of the riparian forest buffer.

Select plants that have higher rates of carbon sequestration in soils and plant biomass and are adapted to the site to assure strong health and vigor. Plant the appropriate stocking rate for the site.

CONSIDERATIONS

Tree and shrub species, which may be alternate hosts to undesirable pests, should be avoided. Species diversity should be considered to avoid loss of function due to species-specific pests.

Using seed and/or seedlings collected or propagated from multiple sources can increase genetic diversity.

Consider selecting species with tolerance to herbicide leakage from adjoining fields.

Allopathic impacts of plants should be considered.

The location, layout and density of the buffer should complement natural features, and mimic natural riparian forests.

For sites where continued function of drains is desired, woody root penetration may eventually plug the underground structure. In these cases, a setback of woody vegetation planted over the drain maintained in herbaceous cover or using rigid, non-perforated pipe will minimize woody root penetration.

Maximize widths, lengths, and connectivity of riparian forest buffers.

The species and plant communities that attain biomass more quickly will sequester carbon/ faster. The rate of carbon sequestration is enhanced as riparian plants mature and soil organic matter increases.

PLANS AND SPECIFICATIONS

A Planting Plan will be prepared by VDOF using the specifications for applying this practice for each proposed site, in addition to an approved specification sheet, job sheets, technical notes, and narrative statements in the conservation plan, or other acceptable documentation for this practice.

Plans and specifications will include, as a minimum, the following:

- Recommended tree/shrub species
- Planting stock type and quantity
- Planting methods
- Site preparation specifications
- Tree density - Row spacing (between and within)
- Vegetation control and maintenance

Use the Riparian Forest Buffer job sheet to plan and certify this practice.

OPERATION AND MAINTENANCE

The riparian forest buffer will be inspected periodically and protected from adverse impacts such as excessive vehicular and pedestrian traffic, pest infestations, concentrated flows, pesticides, livestock or wildlife damage and fire.

Replacement of dead trees or shrubs and control of undesirable vegetative competition will be continued until the buffer is, or will progress to, a fully functional condition.

Consider replanting if seedling survival is poor (<70%). Surviving plants should be evenly distributed over the planting area. Desirable natural regeneration may be substituted for planted material when equivalent to desired species and planned purpose.

Natural regeneration sites will be reevaluated if recruitment and survival after 3 growing seasons is less than 250 evenly distributed seedlings per acre. Once reevaluated, and found with less than the minimum stocking level, an establishment plan for establishment will be developed.

Where tree shelters are used, maintain tree protection twice per year by straightening leaning shelters, replacing broken stakes, and removing bird nets when the tree near the top of the shelter. If the shelter does not have a perforated line and is not photodegradable, the shelter must be cut off when the tree reaches 2.5 to 3 inches in diameter. Remove any competing vegetation and other obstructions inside the shelter. Check for fungus growing on the bark inside the shelter, and if found, remove the shelter.

Control competing vegetation for at least 2 feet in all directions from the planted trees and/or shrubs for at least the first 2 full growing seasons following planting.

Any manipulation of species composition, stand structure and stocking by cutting or killing selected trees and understory vegetation shall sustain the intended purpose(s). Refer to Virginia Conservation Practice Standard Forest Stand Improvement (Code 666).

Control or exclusion of livestock and harmful wildlife shall continue. Refer to Virginia Conservation Practice Standards Prescribed Grazing (Code 528) and/or Access Control (Code 472) as applicable.

Only use fertilizers, pesticides and other chemicals to maintain buffer function that will not impact water quality.

Maintain overland flow through the riparian area as sheet flow.

Periodic removal of some forest products such as high value trees, medicinal herbs, nuts, and fruits is permitted provided the intended purpose is not compromised by the loss of vegetation or harvesting disturbance.

Control harmful plant and animal pest present on the site as necessary to achieve and maintain the intended purpose.

If needed, control competing vegetation until the woody plants are established. Noxious weeds will be controlled. Refer to Virginia Conservation Practice Standard Integrated Pest Management (Code 595) or Herbaceous Weed Control (Code 315).

After trees and/or shrubs are established, refer to the Virginia Conservation Practice Standard Forest Stand Improvement (Code 666) for subsequent management.

REFERENCES

Tjaden, Robert L. and Glenda M. Weber, Fact Sheet #733, Riparian Buffer System, Cooperative Extension Service, University of Maryland.

USDA, Forest Service, 1991, Riparian Forest Buffers-Functional Design for Protection and enhancement of Water Resources, NA0PR-07-91, prepared by David Welsh.

Bentrup, Gary 2008. Conservation buffers: design guidelines for buffers, corridors, and greenways. Gen. Tech. Rep. SRS-109. Asheville, NC: Department of Agriculture, Forest Service, Southern Research Station.

Virginia Cooperative Extension Service “2011 Pest Management Guide” and subsequent revisions available at: http://pubs.ext.vt.edu/456/456-017/456-017.html

Tjaden, Robert L. and Glenda M. Weber, Fact Sheet #724, Introduction to the Riparian Forest Buffer, Cooperative Extension Service, University of Maryland.

USDA, Palone, R. S. and A. H. Todd (editors), 1997, Chesapeake Bay Riparian Handbook: A Guide for Establishing and Maintaining Riparian Forest Buffers, USDA Forest Service, NA-TP-02-97, Radnor, PA.